

Amendments to Claims

Please amend the claims as follows:

Claims 1 to 29 (canceled)

30. (new) A call processing system for monitoring status of a call in a network comprising:

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a first set of sensors connected to one or more subscriber or PSTN network circuits, the first set of sensors configured to sense raw call progress signaling information on the circuit;
a second set of sensors connected to a call control channel of a next generation telephony network (NGTN) network element, the second set of sensors configured to sense NGTN call control message information from the NGTN network element; and
an event analyzer coupled to the first set of sensors and the second set of sensors, the event analyzer configured to:

selectively receive the raw call progress signaling information and the NGTN call control message information, and

process the raw call progress signaling information and the NGTN call control message information to generate logical call handling events;

wherein the event analyzer comprises a call progress event analyzer coupled to the first set of sensors and configured to receive the raw call progress signaling information, the call progress event analyzer comprising:

a call progress event processor configured to:

convert the raw call progress signaling information into logical call handling events,

pass the logical call handling events to a protocol independent call processor, and
accumulate dialed and mid-call digit information for channel associated signaling circuits and element information for common channel signaling circuits; and

a call progress state machine configured to:

receive and analyze logical event information from the protocol independent call processor, and

receive and analyze the digit information and the element information from the call progress event processor.

31. (new) A call processing system for monitoring status of a call in a network comprising:

a first set of sensors connected to one or more subscriber or PSTN network circuits, the first set of sensors configured to sense raw call progress signaling information on the circuit;
a second set of sensors connected to a call control channel of a next generation telephony network (NGTN) network element, the second set of sensors configured to sense NGTN call

control message information from the NGTN network element; and

an event analyzer coupled to the first set of sensors and the second set of sensors, the event analyzer configured to:

selectively receive the raw call progress signaling information and the NGTN call control message information, and

process the raw call progress signaling information and the NGTN call control message information to generate logical call handling events;

wherein the event analyzer further comprises an NGTN event analyzer coupled to the second set of sensors and configured to receive the NGTN call control message information, the NGTN event analyzer comprising:

a NGTN message processor configured to:

decode NGTN call control message information,

convert the NGTN call control message information into logical call handling events,

pass the logical call handling events to a protocol independent call processor; and

accumulate call control message information element information; and

a NGTN state machine configured to:

receive and analyze the logical event information from the protocol independent call processor, and

receive and analyze call control message information element information from the NGTN message processor.

3.
32. (new) The system of claim 31, further comprising the protocol independent call processor configured to selectively receive the logical call handling events from the event analyzer, the protocol independent call processor comprising:

a timer processor coupled to the event analyzer, the timer processor configured to:

calculate an elapsed time from a previous call progress event or an elapsed time from a previous NGTN message event, the elapsed time causing an elapsed-time event for the call progress state machine or the NGTN state machine,

enable one or more timers used to determine wait time for an expected call progress event or NGTN message event, wherein an expiring timer causing an expired-timer event for the call progress state machine or the NGTN state machine, and

send the logical call handling event to the call progress state machine or the NGTN state machine.

4.
33. (new) The system of claim 32, further comprising a call status handler configured to:

maintain current call status information for each call progress event received from the

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call progress event processor, wherein a capturing of the raw call progress signaling information by the first set of sensors is indicative of an occurrence of the call progress event, and

maintain current call status information for each message event received from the NGTN message processor, wherein a capturing of the NGTN call control message by the second set of sensors is indicative of an occurrence of the message event.

5 34. (new) The system of claim ³32, further comprising a state tracker configured to track a current state of the call progress state machine and of the NGTN state machine, the state tracker providing call state information and call status information to the call progress state machine and the NGTN state machine, the current state used by the call progress state machine and the NGTN state machine to transition to a new state.

cont. 35. (new) The system of claim ⁵34, wherein the transitioning from the current state to the new state is dependent on the current call status from the call status handler and a new call progress event received from the call progress event processor or a new message event received from the NGTN message processor.

36. (new) The system of claim ⁶35 wherein, upon transitioning to the new state, the call progress state machine and the NGTN state machine update the call status handler with a new call status, update the state tracker with the new state, inform the timer processor that a current cycle is completed, and when required, enable a new timer in the timer processor.

37. (new) The system of claim ³36, further comprising a call processor executive configured to: receive the call state information and the call status information, translate the call state information and the call status information, and transmit the translated information to an external device.

9. 38. (new) The system of claim ³37, wherein the timer processor is further configured to select a most recent call progress event or message event and clock the call progress state machine or the NGTN state machine respectively, and wherein, when clocked, the call progress state machine analyzes the most recent call progress event and the NGTN state machine analyzes the most recent message event.

10 39. (new) The system of claim ⁹38, wherein, after the most recent call progress event or message event is analyzed, the protocol independent call processor, the call progress state machine and the NGTN state machine wait for a next call progress event or message event to occur.

11 40. (new) The system of claim ⁹38, wherein the timer processor is further configured to determine wait time for an expected call progress event or message event based on receipt time of the previous call progress event or message event.

12 41. (new) A call processing system for monitoring status of a call in a network comprising:

a first set of sensors connected to one or more subscriber or PSTN network circuits, the first set of sensors configured to sense raw call progress signaling information on the circuit;

a second set of sensors connected to a call control channel of a next generation telephony network (NGTN) network element, the second set of sensors configured to sense NGTN call control message information from the NGTN network element;

an event analyzer coupled to the first set of sensors and the second set of sensors, the event analyzer configured to:

selectively receive the raw call progress signaling information and the NGTN call control message information, and

process the raw call progress signaling information and the NGTN call control message information to generate logical call handling events; and

a multi-protocol call analyzer triggered by the timer processor at timer expiration and at end of NGTN state machine or Call Progress state machine cycle, the multi-protocol call analyzer configured to:

use information from the call status handler to transition to a new state, wherein a state of the multi-protocol call analyzer comprises an alarm state or error state, a new analysis state, or both the alarm state and the new analysis state,

pass the new analysis state information to the state tracker,

pass a new call status information to the call status handler,

pass a new timer set information to the timer processor, and

13. notify the timer processor and an alarm handler when entering the alarm state.

~~12.~~ (new) A call processing system for monitoring status of a call in a network comprising:

a first set of sensors connected to one or more subscriber or PSTN network circuits, the first set of sensors configured to sense raw call progress signaling information on the circuit;

a second set of sensors connected to a call control channel of a next generation telephony network (NGTN) network element, the second set of sensors configured to sense NGTN call control message information from the NGTN network element;

an event analyzer coupled to the first set of sensors and the second set of sensors, the event analyzer configured to:

selectively receive the raw call progress signaling information and the NGTN call control message information, and

process the raw call progress signaling information and the NGTN call control message information to generate logical call handling events; and

an alarm handler configured to:

receive call handling error information corresponding to the alarm state from the multi-protocol call analyzer,
accumulate alarm counts, and
trigger an alarm message to external network management systems when the alarm count exceed a defined threshold.

^{14.}
~~43.~~ (new) A method, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information, wherein generating logical call handling events from the raw call progress signaling information comprises:

converting the raw call progress signaling information into the logical call handling event;

setting an elapsed time event, the elapsed time being the time between the call progress event and a most recent call progress event; and

determining if a timer expiration event occur, the timer set for an expected call progress event; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information.

^{15.}
~~44.~~ (new) The method of claim ¹⁴~~43~~, wherein generating logical call handling events from the raw call progress signaling information further comprises:

updating the current call status;

enabling a new timer when there is an expected call progress event; and

^{16.}
waiting for a next call progress event to occur.

~~45.~~ (new) A method, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information, wherein generating logical call handling events from the NGTN message information comprises:

converting the NGTN message information into the logical handling event;
setting the elapsed time event to be the time between the NGTN message event and a most recent NGTN message event; and

determining if the timer expiration event occur, the timer set for an expected NGTN message event; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information.

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cont.
~~17.~~ 46. (new) The method of claim ~~45~~¹⁶, wherein generating logical call handling events from the NGTN message information further comprises:

updating the current call status;

enabling a new timer when there is an expected NGTN message event; and

~~18.~~ waiting for a next NGTN message event to occur.

~~47.~~ (new) A method, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information by analyzing the logical call handling event, the timer expiration event, the elapsed time event, and the current call status such that when an error condition occurs an alarm is generated; maintaining the current call status; providing call records and analysis information associated with the call progress event and the NGTN message event to external display devices; generating call status and call handling error information; accumulating alarm counts; and triggering an alarm message to external network management systems when the alarm counts exceed a defined threshold.

~~19.~~ 48. (new) A computer readable medium containing instructions which, when executed in a processing system, causes the processing system to perform a method for determining and monitoring status of calls in a network, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information, wherein generating logical call handling events from the raw call progress signaling information comprises:

converting the raw call progress signaling information into the logical call handling event;

setting an elapsed time event, the elapsed time being the time between the call progress event and a most recent call progress event; and

determining if a timer expiration event occur, the timer set for an expected call progress event; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information.

20. (new) The computer readable medium of claim 19, wherein generating logical call handling events from the raw call progress signaling information further comprises:

updating the current call status associated with the call progress event;

enabling a new timer when there is an expected call progress event; and

waiting for a next call progress event to occur.

21. (new) A computer readable medium containing instructions which, when executed in a processing system, causes the processing system to perform a method for determining and monitoring status of calls in a network, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information, wherein generating logical call handling events from the NGTN message information comprises:

converting the NGTN message information into the logical call handling event;

setting the elapsed time event to be the time between the NGTN message event and a most recent NGTN message event; and

determining if the timer expiration event occur, the timer set for an expected NGTN message event; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information.

22. (new) The computer readable medium of claim 21, wherein generating logical call handling

events from the NGTN message information further comprises:

- updating the current call status associated with the NGTN message event;
- enabling a new timer when there is an expected NGTN message event; and

23. waiting for a next NGTN message event to occur.

52. (new) A computer readable medium containing instructions which, when executed in a processing system, causes the processing system to perform a method for determining and monitoring status of calls in a network, comprising:

sensing a raw call progress signaling information from one or more subscriber or PSTN network circuits;

sensing a next generation telephony network (NGTN) message information from a NGTN call control channel of a network element;

generating logical call handling events from the raw call progress signaling information and from the NGTN message information; and

processing the logical call handling events corresponding to the raw call progress signaling information and the NGTN message information by analyzing the logical call handling event, the timer expiration event, the elapsed time event, and the current call status such that when an error condition occurs an alarm is generated; maintaining the current call status corresponding to the call progress event and to the NGTN message event; providing call records and analysis information associated with the call progress event and the NGTN message event to external display devices; generating call status and call handling error information corresponding to the call progress event and to the NGTN message event; accumulating alarm counts; and triggering an alarm message to external network management systems when the alarm counts exceed a defined threshold.